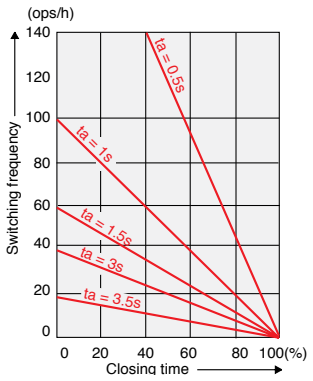
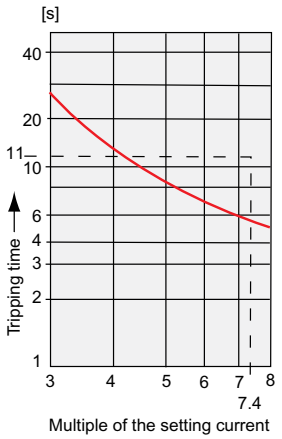
Technical data
TA25DU – TA450DU

Intermittent duty



Switching frequency in relation to load factor.
t_a: motor starting time.



TA thermal O/L relay cold-state tripping characteristics

Switching frequency:

To avoid untimely tripping, TA and T thermal O/L relays have been designed to withstand roughly 15 switching operations per hour with an approximately equal distribution between working and rest cycles.

In these conditions, the motor starting time must not exceed 1 second and the starting current must be lower than or equal to 6 times the motor $\mathbf{I}_n$.

For intermittent operations, the diagram opposite specifies relay operating limits.

Example: Motor starting time: 1 sec.
Load factor: 40 %
Switching frequency: 60 ops./h according to diagram

For a higher number of operations and for load variations (e.g. frequent starting and braking), it is advisable to use CUSTORAPID® protection.

For motors subject to particularly severe operating conditions (e.g. locked rotor) it is advisable to use protection combined with a thermal O/L relay and the CUSTORAPID® system.

Protection of motors with long starting time

See electronic overload relay section, pages 2.21 - 2.32.

Mounting position

On a support at an angle of ± 30° in relation to the vertical plane (standard position).

Other mounting positions possible, except mounting on a horizontal plane (in this case the tripping mechanism would be located above the bimetals).

Special version for EEx e motors

Consult factory.

Tripping limits at ambient temperatures varying by + 20°C

Ambient temperature compensation

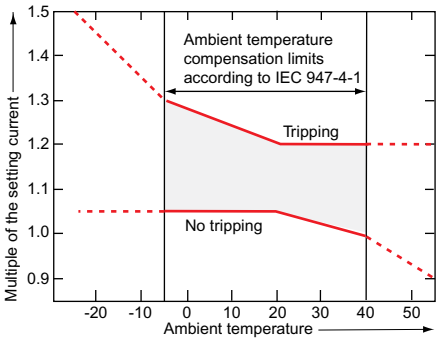
Thermal O/L relays are compensated against ambient temperature variations by a compensation bimetal which is sensitive to the ambient temperature.

Thermal O/L relays are designed to operate between –5 °C and +40 °C in compliance with standard IEC 947-4-1. For a wider range of –25° C to +55 °C consult the graph opposite.

Example: tripping at –25 °C. Tripping takes place before 1.5 times the setting current.

Resetting: TA25DU – TA450 DU thermal O/L relays have convertible manual/automatic resetting.

Delivery: in manual resetting mode.



Technical data
TA25DU – TA80DU

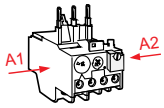
Types		TA25DU	TA42DU	TA75DU	TA80DU
Standards: (international, European)		IEC 947-4-1, EN 60947-4-1			
Rated insulation voltage U_i according to IEC 947-4-1	V	690			
Rated impulse withstand voltage U_{imp} according to IEC 947-4-1	kV	6			
Permissible ambient temperature – for storage	°C	–40 to +70			
– for operation	°C	–25 to +55 with temperature compensation (maximum values: see page 2.9)			
Climatic withstand DIN 50017		Humidity in alternate climate KFW, 30 cycles			
Mounting positions		On a support at an angle of ±30° in relation to the vertical plane (standard position). Other positions possible except mounting on a horizontal plane (in this case the tripping mechanism would be located above the bimetals).			
Shock withstand at nominal I_e	shock duration ms	15			
Critical direction of shocks A1, A2	multiples of g	12			
Resistance to vibrations (±1 mm, 50 Hz)	multiples of g	8			
Mounting – on contactor		Latching below the contactor, screw fixing on main terminals			
– separate with DB - kit		Using screws: 2 x M4 or 35 mm EN 50022			
Terminals and cross-sectional areas for main conductors (motor side)		TA25DU setting ranges: from 0.1-0.16A to 18-25A	24-32 A		
• screw terminal		M4	–		
– with cable clamp		–	M5	M6	M6
– via tunnel connector		–	–	–	–
– flat type for lug or bar		–	–	–	–
• conductor cross-sectional area					
– rigid solid or rigid stranded	mm^2	2 x 1.5 - 6	1 x 10	1 x 2.5 - 35 or 2 x 2.5 x 16	
– flexible with cable end	mm^2	2 x 1.5 - 4	2 x 0.75- 6	1 x 2.5 - 25 or 2 x 2.5 x 10	
– recommended bars	mm	–	–	–	–
Terminals and cross-sectional area for auxiliary conductors					
• screw terminal (screw size)					
– with cable clamp		M 3.5			
• conductor cross-sectional area					
– rigid solid or rigid stranded	2 x mm^2	0.75 - 4			
– flexible with cable end	2 x mm^2	0.75 - 2.5			
Degree of protection		All the terminals are protected against direct contact according to VDE 0106/Part. 100. (without additional terminal shrouds)			All the terminals are protected against direct
					direct contact according to VDE0106/part 100 (with additional terminal shrouds for the main terminals

Pole Technical Characteristics

Types		TA25 DU	TA42 DU	TA75 DU	TA80 DU	TA10 DU	TA200 DU	TA450 DU
Number of poles		3						
Setting ranges		see page 2.6						
Tripping class according to IEC 947-4-1, EN 60947-1		10 A						
Rated operational frequencies	Hz	0 - 400						50/60
Max. switching frequency without untimely tripping		Up to 15 starts/h or 60 starts/h with 40 % on-load factor when neither the starting current of 6 x I_n nor the starting time 1 s are exceeded.						
Resistance per phase in mΩ and heat dissipation in W		see page 2.13						

Technical data
TA110DU – TA450DU

Types		TA110DU	TA200DU	TA450DU
Standards: (international, European)		IEC 947-4-1, EN 60947-4-1		
Rated insulation voltage U_i according to IEC 947-4-1	V	690		1000
Rated impulse withstand voltage U_{imp} according to IEC 947-4-1	kV	6		8
Permissible ambient temperature				
– for storage	°C	–40 to +70		
– for operation	°C	–25 to +55 with temperature compensation (maximum values: see page 2.9)		
Climatic withstand DIN 50017		Humidity in alternate climate KFW, 30 cycles		
Mounting positions		On a support at an angle of ±30° in relation to the vertical plane (standard position). Other positions possible except mounting on a horizontal plane (in this case the tripping mechanism would be located above the bimetals).		
Shock withstand at nominal I_e	shock duration ms	15		
Critical direction of shocks A1, A2	multiples of g	12		
Resistance to vibrations (±1 mm, 50 Hz)	multiples of g	8		
Mounting – on contactor – separate with DB - kit		4 x M5 screws		
Terminals and cross-sectional areas for main conductors (motor side)				
• screw terminal				
– with cable clamp		–	–	–
– via tunnel connector		HC, M8	–	–
– flat type for lug or bar		–	M10	M10
• conductor cross-sectional area				
– rigid solid or rigid stranded	mm^2	16 – 35	25 – 120	2 x 240
– flexible with cable end	mm^2	16 – 35	25 – 95	2 x 240
– recommended bars	mm	12 x 3	20 x 4	20 x 4...5
Terminals and cross-sectional area for auxiliary conductors				
• screw terminal (screw size) – with cable clamp		M 3.5		
• conductor cross-sectional area				
– rigid solid or rigid stranded	2 x mm^2	0.75 - 4		
– flexible with cable end	2 x mm^2	0.75 - 2.5		
Degree of protection		All the terminals are protected against direct contact according to VDE 0106/Part. 100. (with additional terminal shrouds)		



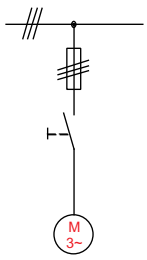
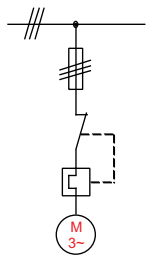
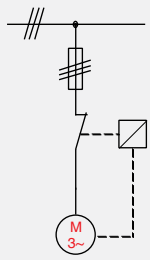
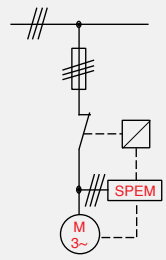
Technical characteristics of auxiliary contacts for thermal O/L relays: TA25DU to TA450DU

Auxiliary contacts		normally closed N.C.	normally open N.O.
Terminal marking		95-96	97-98
Rated operational voltage U_e	VAC	500	500
Conventional thermal current (in free air) I_{th}	A	10	6
Rated operational current I_e, AC-15			
up to 240 V	A	3.0	1.5
up to 440 V	A	1.9	0.95
up to 500 V	A	1.0	0.75
Rated operational current I_e DC-13			
up to 250 V	A	0.12	0.04
Protection against short circuits			
gG (gl) fuses (according to IEC 269)	A	10	6
S 271/S 281circuit-breaker	A	k3	k1
Maximum potential difference between N.C. and N.O. auxiliary contacts	VAC VDC	500 440	500 440

Motor Protection — general

It is very important to choose an adequate protective device for the safety of the motor during operation and for its durability.
The efficiency of protection methods varies according to the application. The overview below will help you to choose.
There is no general rule and we are available to advise you for special applications and especially in the case of difficult starting.

Protective devices and efficiency

	Protection in relation to current:		Protection in relation to temperature:	
	Fuses	Protective relay with phase fault protection	Motor protection via CUSTORAPID® thermistor	Motor protection via SPEM electronic relay
				
Causes of dangerous overloads for the motor windings				
1 Overload with current 1.2 times the nominal current	❑	●	●	●
2 S1-S8 nominal duties according to IEC 34-I	❑	■	●	●
3 Operation with starting, braking, reversal in operating direction	❑	■	●	●
4 Operation with starting rate at > 15 cycles/hour	❑	■	●	●
5 Locked rotor	■	●	■ for motors with special rotor	●
6 Overloads due to phase failure	❑	●	●	●
7 Network undervoltage or overvoltage	❑	●	●	●
8 Fluctuation of network frequency	❑	●	●	❑
9 Ambient temperature too high	❑	●	●	❑
10 Overheating due to external cause (i.e. overheating of bearings)	❑	❑	●	❑
11 Motor cooling disturbed	❑	❑	●	❑
12				Undercurrent protection on drop in load
13				Protection of asymmetry: wrong phase direction rotation or asymmetrical load
14				Earth fault protection
15				Automatic disconnection for auxiliary load fault

Protection efficiency:

- ❑ unsuitable
- ■ very average efficiency
- ● perfectly efficient

Note: Fuses

Fuses do not protect motors against overloads. They are only used to protect installations and lines against short circuits.

To ensure efficient protection of a motor against short circuits, it is advisable to use aM type fuses in association with thermal OLR relays.

For the selection of fuses or circuit-breakers, refer to the indications given in this catalogue concerning contactors on the one hand and thermal O/L relays on the other.

In general, fuse protection for direct-on-line starting must be sized as follows:
– aM fuses: choose the fuse rating immediately above the full load value of the motor current.
– gG (gl) fuses: determine the fuse rating immediately above the motor current value and choose the next highest fuse rating.

Technical data
Resistance and Joule losses per phase
Short circuit protection

Resistance and Joule losses per phase, short circuit protection

Setting range current from – to A A	Resistance per phase mΩ	Joule losses per phase at max. setting W
TA25DU		
0.1 – 0.16	85850	2.2
0.16 – 0.25	85150	2.2
0.25 – 0.4	13750	2.2
0.4 – 0.63	5370	2.2
0.63 – 1.0	2190	2.2
1.0 – 1.4	1120	2.2
1.3 – 1.8	670	2.2
1.7 – 2.4	383	2.2
2.2 – 3.1	229	2.2
2.8 – 4.0	137	2.2
3.5 – 5.0	87.5	2.2
4.5 – 6.5	61	2.2
6.0 – 8.5	30.4	2.2
7.5 – 11	18.2	2.2
10 – 14	11.2	2.2
13 – 19	6.3	2.3
18 – 25	4.7	2.9
24 – 32	3.2	3.3
TA42DU		
18 – 25	5.5	3.43
22 – 32	2.89	2.91
29 – 42	1.84	3.24
TA75DU		
18 – 25	5.5	3.43
22 – 32	2.89	2.91
29 – 42	1.84	3.24
36 – 52	1.3	3.51
45 – 63	0.936	3.72
60 – 80	0.615	3.94
TA80DU		
29 – 42	1.84	3.24
36 – 52	1.3	3.51
45 – 63	0.936	3.72
60 – 80	0.615	3.94

Setting range current from – to A A	Resistance per phase mΩ	Joule losses per phase at max. setting W
TA110DU		
80 – 110	0.378	3.78
TA200DU		
100 – 135	0.318	5.79
110 – 150	0.255	5.74
130 – 175	0.214	6.55
150 – 200	0.182	7.28
TA450DU		
130 – 185	—	2.5
165 – 235	—	2.5
220 – 310	—	2.5

Technical data
Tripping curves


TA25DU


TA75DU

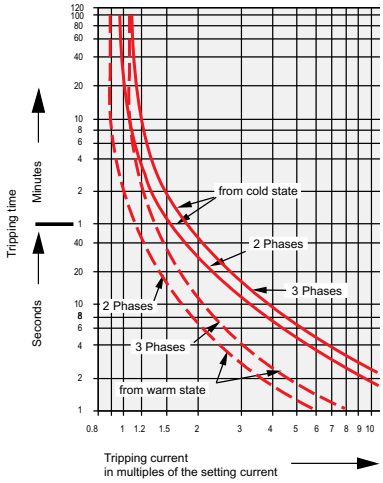

TA110DU/SU


TA450DU

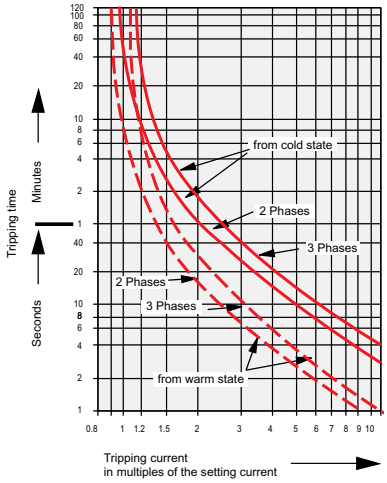
TA-DU thermal O/L relays are 3-pole with manual or automatic resetting mode selection.
The resetting button can also be used for stopping.
Built-in auxiliary contacts are physically separate and, consequently, can be used in different circuits (control circuit/indication circuit).
Each relay is temperature compensated and ensures phase failure protection.
Protective relays up to size TA75DU are protected against direct contact via the front face. Terminal shrouds are available for TA200DU to TA450DU size relays.
The connecting terminals are delivered in open position with (+,-) pozidriv screws and screwdriver guidance. It is advisable to tighten unused terminal screws.

Thermal O/L relay tripping curves

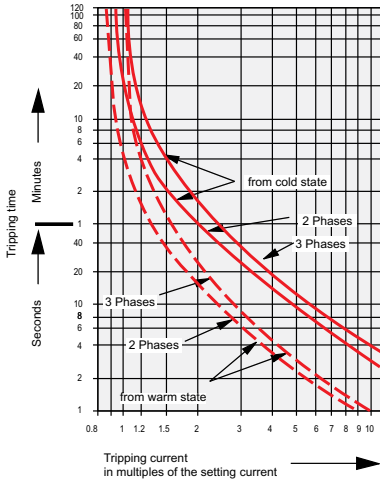
TA25DU
(tripping class 10A)



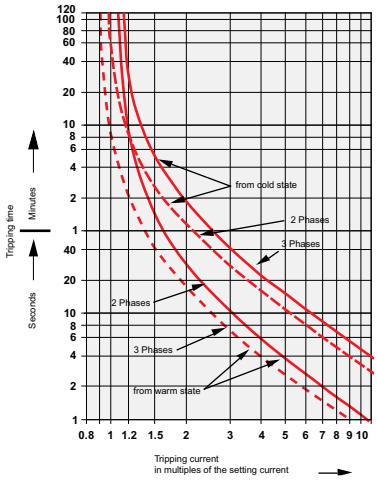
TA42DU, TA75DU and TA80DU
(tripping class 10A)



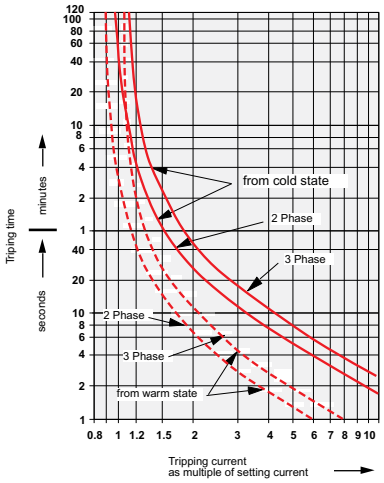
TA110DU
(tripping class 10A)



TA200DU
(tripping class 10A)



TA450DU
(tripping class 10A)



Technical data, Class 20 OLR
Resistance and Joule losses per phase
Short circuit protection

Setting Range	Short-circuit protection (fuses)		UL	UL	Resistance per phase	Power Loss per phase
	Type "2" co-ordination	Type "1" co-ordination				
from ... to A A	gL/gG A	gL/gG A	Fuse/600V K5 A	600V CB A	mOhm	at upper current setting W
Thermal overload relay TA25DU trip class 20						
1.3 ... 1.8	10	25	6	-	670.3	2.2
1.7 ... 2.4	16	25	10	-	381	2.2
2.2 ... 3.1	16	25	10	-	235.3	2.3
2.8 ... 4.0	20	25	15	-	140.7	2.3
3.5 ... 5.0	25	25	20	-	91.2	2.3
4.5 ... 6.5	25	25	25	-	54.5	2.3
6.0 ... 8.5	32	32	35	-	32.1	2.3
7.5 ... 11	40	40	45	-	15.5	1.9
10 ... 14	50	50	60	-	12	2.4
13 ... 19	63	63	60	-	6.3	2.3
18 ... 25	80	80	70	-	4.7	3.0
24 ... 32	100	100	100	-	3.2	3.3
Thermal overload relay TA42DU trip class 20						
18 ... 25	100	160	80	80	5.5	3.43
22 ... 32	125	160	100	80	2.89	2.91
29 ... 42	160	160	150	80	1.84	3.24
Thermal overload relay TA75DU trip class 20						
18 ...25	100	160	80	80	5.5	3.43
22 ... 32	125	160	100	80	2.89	2.91
29 ...42	160	160	150	80	1.84	3.24
36 ... 52	200	200	175	125	1.3	3.51
45 ... 63	200	250	200	125	0.936	3.72
60 ... 80	250	250	250	125	0.615	3.94
Thermal overload relay TA80DU trip class 20						
29 ... 42	160	160	150	80	1.84	3.24
36 ... 52	200	200	175	125	1.3	3.51
45 ... 63	200	250	200	125	0.936	3.72
60 ... 80	250	250	250	150	0.615	3.94

Type 1 co-ordination according to IEC 60947-4-1: Under short-circuit conditions, the starter shall cause no danger to persons or installation and may not be suitable for further service without repair and replacement of parts.

Type 2 co-ordination according to IEC 60947-4-1: Under short-circuit conditions, the contactor or starter shall cause no danger to persons or installation and shall be suitable for further use. The risk of contact welding is recognized, in which case the manufacturer shall indicate the measures to be taken as regards the maintenance of the equipment.

Standard technical data, operating data and dimensions see TA...Relay Main Catalog

Technical data, Class 20 OLR
Short-circuit ratings

Setting Range	Catalog number	Voltage	5 kA		10 kA		18 kA	
A ... A		480V	Fuse K5	CB	Fuse K5	CB	Fuse K5	CB
1.3 ... 1.8	TA25DU-1.8-20	TA25DU	6	-	6	-	6	-
1.7 ... 2.4	TA25DU-2.4-20		10	-	10	-	10	-
2.2 ... 3.1	TA25DU-3.1-20		10	-	10	-	10	-
2.8 ... 4.0	TA25DU-4.0-20		15	-	15	-	15	-
3.5 ... 5.0	TA25DU-5.0-20		20	-	20	-	20	-
4.5 ... 6.5	TA25DU-6.5-20		25	-	25	-	25	-
6.0 ... 8.5	TA25DU-8.5-20		35	-	35	-	35	-
7.5 ... 11	TA25DU-11-20		45	-	45	-	45	-
10 ... 14	TA25DU-14-20		60	-	60	-	60	-
13 ... 19	TA25DU-19-20		60	-	60	-	60	-
18 ... 25	TA25DU-25-20		70	-	70	-	70	-
24 ... 32	TA25DU-32-20		100	-	100	-	100	-
18 ... 25	TA42DU-25-20	TA42DU	80	80	80	-	150	-
22 ...32	TA42DU-32-20		100	80	100	-	150	-
29 ... 42	TA42DU-42-20		150	80	150	-	200	-
18 ... 25	TA75DU-25-20	TA75DU	80	80	80	-	150	-
22 ... 32	TA75DU-32-20		100	80	100	-	150	-
29 ... 42	TA75DU-42-20		150	80	150	-	200	-
36 ... 52	TA75DU-52-20		175	125	175	-	250	-
45 ... 63	TA75DU-63-20		200	125	200	-	250	-
60 ... 80	TA75DU-80-20		250	125	250	-	250	-
29 ... 42	TA80DU-42-20	TA80DU	150	80	150	-	150	-
36 ... 52	TA80DU-52-20		175	125	175	-	175	-
45 ... 63	TA80DU-63-20		200	125	200	-	250	-
60 ... 80	TA80DU-80-20		250	150	250	-	250	-

Setting Range	Catalog number	Voltage	5 kA		10 kA		18 kA	
A ... A		600V	Fuse K5	CB	Fuse K5	CB	Fuse K5	CB
1.3 ... 1.8	TA25DU-1.8-20	TA25DU	6	-	6	-	6	-
1.7 ... 2.4	TA25DU-2.4-20		10	-	10	-	10	-
2.2 ... 3.1	TA25DU-3.1-20		10	-	10	-	10	-
2.8 ... 4.0	TA25DU-4.0-20		15	-	15	-	15	-
3.5 ... 5.0	TA25DU-5.0-20		20	-	20	-	20	-
4.5 ... 6.5	TA25DU-6.5-20		25	-	25	-	25	-
6.0 ... 8.5	TA25DU-8.5-20		35	-	35	-	35	-
7.5 ... 11	TA25DU-11-20		45	-	45	-	45	-
10 ... 14	TA25DU-14-20		60	-	60	-	60	-
13 ... 19	TA25DU-19-20		60	-	60	-	60	-
18 ... 25	TA25DU-25-20		70	-	70	-	70	-
24 ... 32	TA25DU-32-20		100	-	100	-	100	-
18 ... 25	TA42DU-25-20	TA42DU	80	80	80	-	150	-
22 ...32	TA42DU-32-20		100	80	100	-	150	-
29 ... 42	TA42DU-42-20		150	80	150	-	200	-
18 ... 25	TA75DU-25-20	TA75DU	80	80	80	-	150	-
22 ... 32	TA75DU-32-20		100	80	100	-	150	-
29 ... 42	TA75DU-42-20		150	80	150	-	150	-
36 ... 52	TA75DU-52-20		175	125	175	-	175	-
45 ... 63	TA75DU-63-20		200	125	200	-	250	-
60 ... 80	TA75DU-80-20		250	125	250	-	250	-
29 ... 42	TA80DU-42-20	TA80DU	150	80	150	-	150	-
36 ... 52	TA80DU-52-20		175	125	175	-	175	-
45 ... 63	TA80DU-63-20		200	125	200	-	250	-
60 ... 80	TA80DU-80-20		250	150	250	-	250	-

Technical data, Class 20 OLR
Table for tripping time

Tripping times of thermal overload relays as a function of a multiple of the setting current from cold state (tolerance +/- 20% of the tripping time).

Setting Range	Tripping times of thermal overload relays: at multiple of setting current					
	3	4	5	6	7.2	8
from ... to A A	Tripping times in seconds					
Thermal overload relays TA25DU trip class 20						
1.3 ... 1.8	47.1	27	20.3	15.8	12.7	11.5
1.7 ... 2.4	43.3	25	18.9	14.4	11.9	10.4
2.2 ... 3.1	47.5	28	20.8	16	13.1	11.8
2.8 ... 4.0	45.6	27	19.8	15.3	12.5	11
3.5 ... 5.0	47.8	29	21.2	16	13.2	11.8
4.5 ... 6.5	47.4	28	20.3	15.5	12.5	11
6.0 ... 8.5	46.1	27	20	15	11.7	10
7.5 ... 11	42.3	25	17.8	14.1	10.9	10.5
10 ... 14	39.4	25	16.8	13	9.9	8.5
13 ... 19	38.1	21	13.6	10	7.4	6.2
18 ... 25	44.4	25	16.1	11	9	8
24 ... 32	44.4	27	17.7	13	9.8	8.5
Thermal overload relays TA42DU, TA75DU, TA80DU trip class 20						
18 ... 25	51.6	29	20.3	15	11.7	10
22 ... 32	67.9	38	26.9	20	14.8	12.5
29 ... 42	58.8	33	22.5	16	12.2	10.3
36 ... 52	59.9	34	22.7	16	12.3	10.5
45 ... 63	65.8	34	22.4	16	12.4	10.5
60 ... 80	71.9	35	23.4	17	13.9	12